WHAT IS CLAIMED IS:

1. A method of forming a negative pattern of carbon nanotubes, wherein the method comprises the steps of:

(a) dispersing carbon nanotubes in an organic solvent with one or more photoacid or photobase generator to provide a liquid coating composition, wherein surfaces of the carbon nanotubes are modified with an oxirane group of formula (1) and/or surfaces of the carbon nanotubes are modified with an anhydride group of formula (2), (3), (4), (5), (6) or (7):

$$—O-H_2C—HC-CH_2$$

(1);

(2);

wherein, R is C_{1-15}, linear, branched or cyclic alkylene;

(3);

(4);
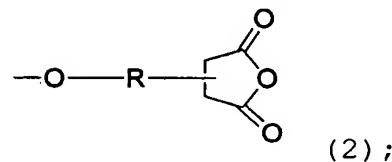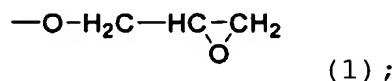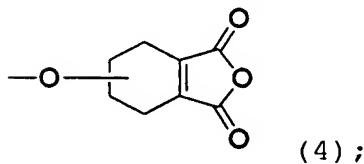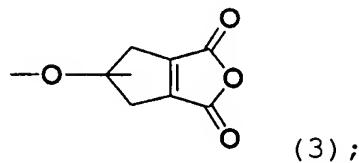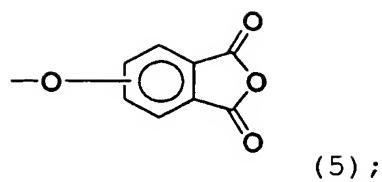
(5);
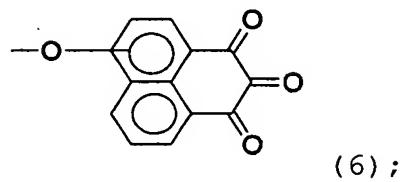
(6);
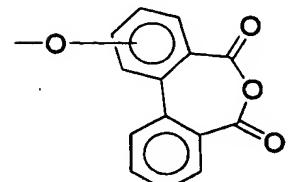
(7);

(b)   applying   the   liquid   coating   composition   onto   a
      substrate   and   evaporating   the   organic   solvent   by
      prebaking   to   deposit   a   coating   film   on   the
      substrate;

(c)   exposing   the   coating   film   to   UV   light   through   a
      photomask   having   a   desired   pattern   to   induce
      photopolymerization   of   the   surface-modified   carbon
      nanotubes   in   exposed   areas   of   the   coating   film;
      and

(d)   developing   the   exposed   coating   film   with   an
      organic   developer   to   remove   unexposed   areas   of   the
      coating   film,   resulting   in   a   negative   pattern   of
      carbon   nanotubes.

2. The method according to claim 1, wherein the liquid coating composition comprises 3-95wt% of the carbon nanotubes and 0.1-15 parts by weight of the photoacid or photobase generator based on 100 parts by weight of the carbon nanotubes.

3. The method according to claim 1, wherein the liquid coating composition further comprises 0.3-2 parts by weight of a photo intensifier based on 100 parts by weight of the carbon nanotubes, wherein the photo intensifier is one or more selected from the group consisting of 2-ethyl-9,10-dimethoxyanthracene, 9,10-dichloroanthracene, 1-chloro-anthracene, 2-methylanthracene, 9-methylanthracene, 2-t-butylanthracene, anthracene, 1,2-benzanthracene, 1,2,3,4-dibenzanthracene, 1,2,5,6-dibenzanthracene, 1,2,7,8-dibenz-anthracene, 9,10- dimethoxydimethylanthracene, 2-ethyl-9,10-dimethoxyanthracene, N-methylphenothiazine, and isopropylthioxanthone.

4. The method according to claim 1, wherein the organic solvent used in step (a) is one or more selected from the group consisting of DMF, 4-hydroxy-4-methyl-2-pentanone, ethylene glycol monoethyl ether, 2-methoxyethanol, methoxypropylacetate, ethyl-3-ethoxy-propionate, and cyclohexanone.

5. The method according to claim 1, wherein the liquid coating composition further comprises 0.1-10 parts by weight of a coupling agent based on 100 parts by weight of the carbon nanotubes, wherein the coupling agent is one or more selected from the group consisting of aminopropyltriethoxysilane, phenylaminopropyltrimethoxysilane, ureidopropyltriethoxysilane, glycidoxypropyltrimethoxysilane, isocyanatopropyltriethoxysilane, isopropyltriisostearoyltitanate, and acetoalkoxyaluminium diisopropylate.

6. The method according to claim 1, wherein the liquid coating composition further comprises 1-95 parts by weight of an oxirane group-containing monomer, oligomer or polymer, and/or an anhydride group-containing monomer, oligomer or polymer to 100 parts by weight of the carbon nanotubes.

7. The method according to claim 1, wherein the liquid coating composition further comprises 1-30 parts by weight of a polymer binder based on 100 parts by weight of the carbon nanotubes, wherein the polymer binder is one or more selected from the group consisting of polyester,

polycarbonate, polyvinylalcohol, polyvinylbutylal, polyacetal, polyarylate, polyamide, polyamideimide, polyetherimide, polyphenyleneether, polyphenylenesulfide, polyethersulfone, polyetherketone, polyphthalamide,

5   polyethernitrile, polybenzimidazole, polycarbodiimide, polysiloxane, polymethylmethacrylate, polymethacrylamide, nitrile rubber, acryl rubber, polyethylenetetrafluoride, epoxy resin, phenol resin, melamine resin, urea resin, polybutene, polypentene, ethylene-propylene copolymer,

10   ethylene-butene-diene copolymer, polybutadiene, polyisoprene, ethylene-propylene-diene copolymer, butyl rubber, polymethylpentene, polystyrene, styrene-butadiene copolymer, hydrogenated styrene-butadiene copolymer, hydrogenated polyisoprene, and hydrogenated polybutadiene.

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8. The method according to claim 1, wherein the method further comprises a step of post curing the exposed coating film after step (c).

20   9. A method of producing a polymerized carbon nanotube composite, wherein the method comprises the steps of:

(a) dispersing carbon nanotubes in an organic solvent along with one or more thermal hardener to provide a liquid coating composition, wherein surfaces of

25   the carbon nanotubes are modified with an oxirane

group of formula (1) and/or surfaces of the carbon nanotubes are modified with an anhydride group of formula (2), (3), (4), (5), (6) or (7):

$$-O-H_2C-HC-CH_2 \atop O$$ (1);

—O—R— $\begin{array}{c} O \\ \\ O \\ \\ O \end{array}$ (2);

wherein, R is C_{1-15}, linear, branched or cyclic alkylene;

—O— $\begin{array}{c} O \\ \\ O \\ \\ O \end{array}$ (3);

—O— $\begin{array}{c} O \\ \\ O \\ \\ O \end{array}$ (4);

—O— $\begin{array}{c} O \\ \\ O \\ \\ O \end{array}$ (5);

—O— $\begin{array}{c} O \\ O \\ O \end{array}$ (6);
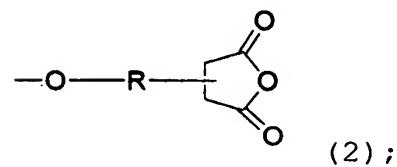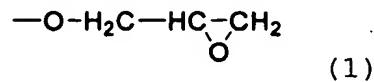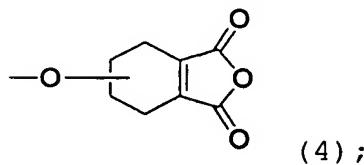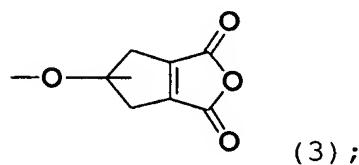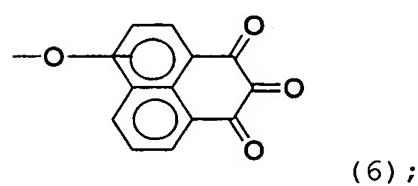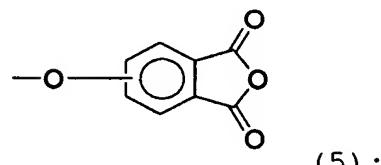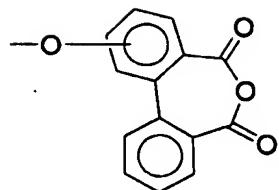
(7);

(a) applying the liquid coating composition onto a substrate and heatcuring to provide a polymerized carbon nanotube composite.

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10. The method according to claim 9, wherein the liquid coating composition comprises 3-95wt% of the carbon nanotubes and 1-35 parts by weight of the thermal hardener based on 100 parts by weight of the carbon nanotubes.

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11. The method according to claim 9, wherein the organic solvent used in step (a) is one or more selected from the group consisting of DMF, 4-hydroxy-4-methyl-2-pentanone, ethylene glycol monoethyl ether, 2-methoxyethanol, methoxypropylacetate, ethyl-3-ethoxypropionate, and cyclohexanone.

12. The method according to claim 9, wherein the liquid coating composition further comprises 0.1-10 parts by weight of a coupling agent based on 100 parts by weight of the carbon nanotubes, wherein the coupling agent is one or more selected from the group consisting of

aminopropyltriethoxysilane,

phenylaminopropyltrimethoxysilane,

ureidopropyltriethoxysilane,

glycidoxypropyltrimethoxysilane,

5   isocyanatopropyltriethoxysilane,

isopropyltriisostearoyltitanate,   and   acetoalkoxyaluminium

diisopropylate.

    13.   The   method   according   to   claim   9,   wherein   the

10 liquid   coating   composition   further   comprises   1-95   parts   by

weight   of   an   oxirane   group-containing   monomer,   oligomer   or

polymer,   and/or   an   anhydride   group-containing   monomer,

oligomer   or   polymer.

15   14.   The   method   according   to   claim   9,   wherein   the

liquid   coating   composition   further   comprises   1-30   parts   by

weight   of   a   polymer   binder   based   on   100   parts   by   weight   of

the   carbon   nanotubes,   wherein   the   polymer   binder   is   one   or

more   selected   from   the   group   consisting   of   polyester,

20 polycarbonate,   polyvinylalcohol,   polyvinylbutylal,

polyacetal,   polyarylate,   polyamide,   polyamideimide,

polyetherimide,   polyphenyleneether,   polyphenylenesulfide,

polyethersulfone,   polyetherketone,   polyphthalamide,

polyethernitrile,   polybenzimidazole,   polycarbodiimide,

25 polysiloxane,   polymethylmethacrylate,   polymethacrylamide,

nitrile rubber, acryl rubber, polyethylenetetrafluoride, epoxy resin, phenol resin, melamine resin, urea resin, polybutene, polypentene, ethylene-propylene copolymer, ethylene-butene-diene copolymer, polybutadiene, polyisoprene, ethylene-propylene-diene copolymer, butyl rubber, polymethylpentene, polystyrene, styrene-butadiene copolymer, hydrogenated styrene-butadiene copolymer, hydrogenated polyisoprene, and hydrogenated polybutadiene.

15. A negative pattern of carbon nanotubes prepared by the method according to claim 1.

16. A polymerized carbon nanotube composite prepared by the method according to claim 9.